SSGIC

Fire Managers and Fuels Specialists
October 2, 2002
Sequoia National Forest Headquarters – Porterville, CA

SSGIC Meeting Participants, 10/02/2002

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Overview

The Southern Sierra Geographic Information Cooperative (SSGIC) is an interagency cooperative with five primary stakeholder agencies, Bakersfield BLM, CDF-Tulare unit, Kern Co. Fire Dept., Sequoia National Forest, and Sequoia & Kings Canyon National Parks. The project's primary goal is to develop a landscape scale framework for interagency fire management planning. Participants at this meeting included fire managers and fuels specialists. With data development and preliminary analysis essentially complete, focus has shifted to integrating these analysis outputs into a process to collaboratively identify high priority fuels treatment areas. Results of this meeting will be presented to the larger SSGIC group on Oct 3, 2002. **Bold** text indicates an action item.

Objective

The purpose of this meeting was to

- Evaluate preliminary assessments of Risk, Hazard, Value (Ecological and Social/Economic), and Susceptibility (Fig. 1).
- Develop a process to integrate the above to identify high priority fuels treatment areas across the Southern Sierra Nevada.
- Demonstrate the Asset Analyzer decision making tool and evaluate its usefulness as the modeling tool to use in this analysis.

Completed Analyses

Anne Birkholz presented an overview (Fig. 1) of the analytical process adopted by SSGIC. The FLAMMAP model was utilized to predict fire hazard/behavior. Outputs of Rate of Spread, Flame Length, and Crown Fire Activity were generated using FLAMMAP software. Fire risk, or probability of ignition, was defined by the Fire Occurrence Area (FOA) model. Hazard and risk were subsequently integrated into a Wildland Fire Susceptibility Index (WFSI) utilizing local regression tables to predict a final fire size from FLAMMAP Rate of Spread outputs (see notes from April 7, 2002 meeting). The ecological benefit of fire was evaluated using the Fire Return Interval Departure (FRID) model that determines fire exclusion by vegetation type. Social and economic values are dynamic and evaluated utilizing the Asset Analyzer decision making software tool developed by the SSGIC. It was noted that recently completed, second generation vegetation, fuels, and canopy cover data were used in these analyses, as well as three newly developed themes describing the forest canopy. These characteristics are important to predicting crown fire behavior in FLAMMAP. A more thorough discussion of the analyses can be found in the Oct. 3, 2002 meeting notes.

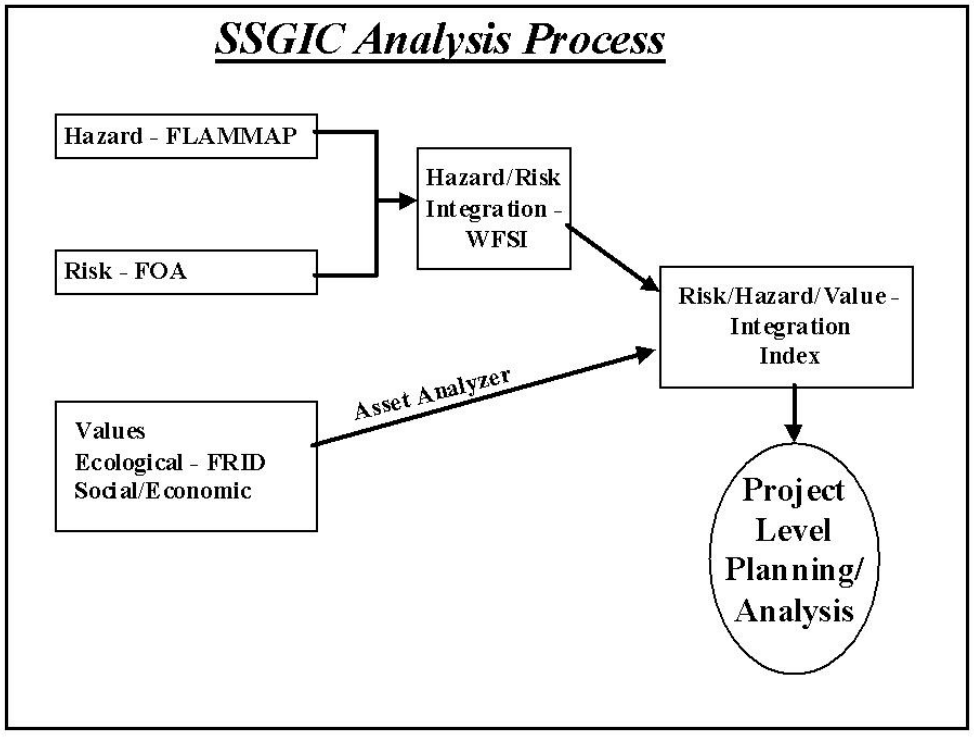

Figure 1

These analyses will contribute to the final integration of Hazard, Risk, and Value.

Asset Analyzer Application and Data Review

The Asset Analyzer was originally developed by the California Department of Forestry and Fire Protection (CDF) to apply a weighted sum to selected datasets to identify areas of high value. It was manually run and the resolution was insufficient for project level analysis. The SSGIC has

enhanced the original CDF model and developed the ArcView Spatial Analyst extension as a decision making tool. It incorporates a "user friendly" interface and the resolution is limited only by the source datasets. The user begins by selecting the source datasets to be included in the analysis. Weights are then applied to each datasets defining its percent contribution to the final output. The user can define the project area in any of several ways and determine the resolution of the final output. Once the analysis is run to calculate the weighted sum (Fig 2), the normalized output can be categorized into classes for display (Fig 3).

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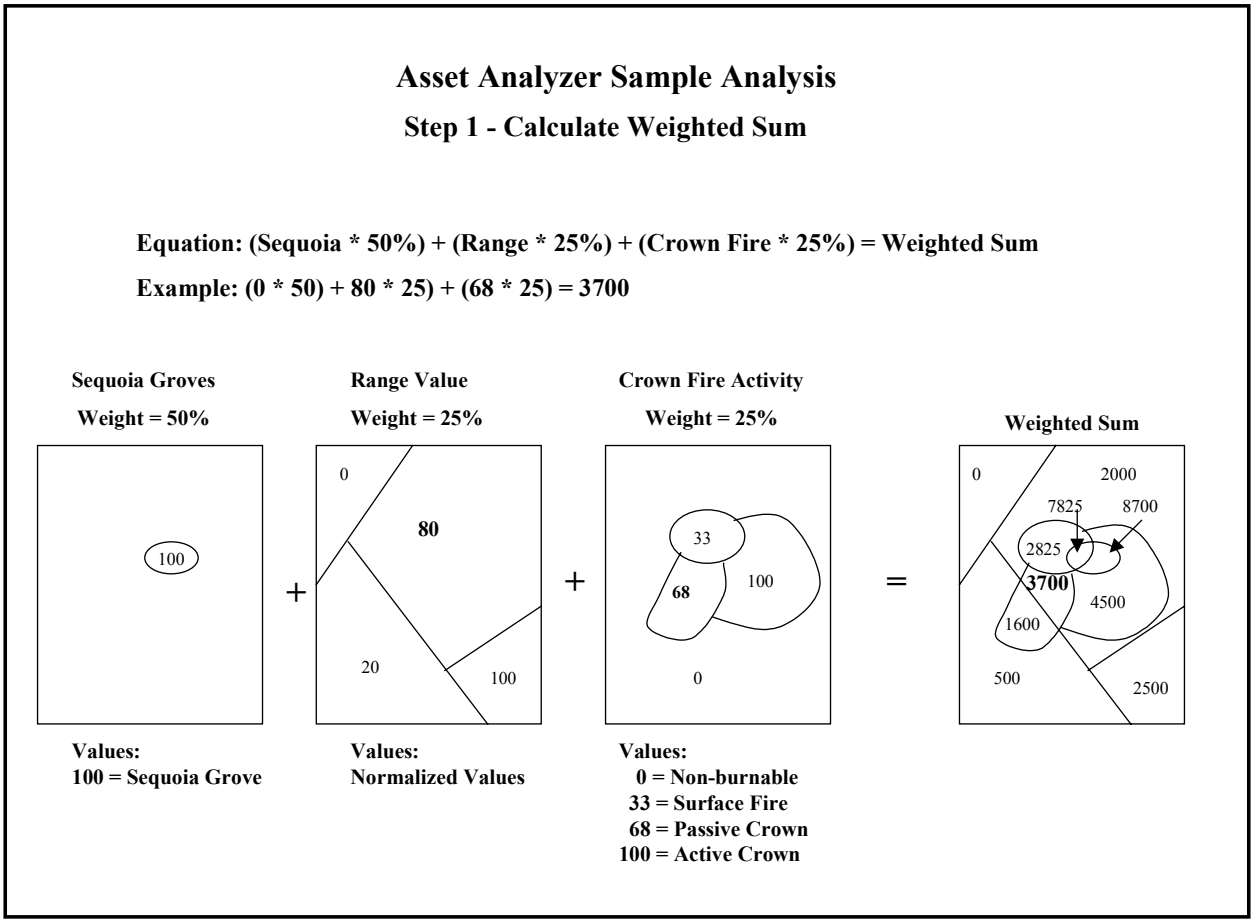

Figure 2

All spatial datasets used as source data need to be formatted specifically for use in the Asset Analyzer. They must be in grid format and, to be equally represented in the analysis, normalized between 0 and 100. As an example, for datasets such as Sequoia Groves, the value of a grove is 100 while areas outside groves receive no value. For other datasets, such as the value of range forage, the entire scale from 0 to 100 is utilized. Datasets categorized as high, medium, or low, such as crown fire activity, are represented as 100, 68, and 33 respectively. Table 1 in Appendix A lists the datasets developed by the SSGIC for use with the Asset Analyzer to evaluate Social/Economic values. Table 2 in Appendix A lists analysis outputs normalized for Asset Analyzer use as a decision-making tool. Scenario outputs are dependent on both the selection of source datasets, as well as the weights assigned to each source. The Asset Analyzer outputs themselves are grids normalized over the 0 – 100 range of values.

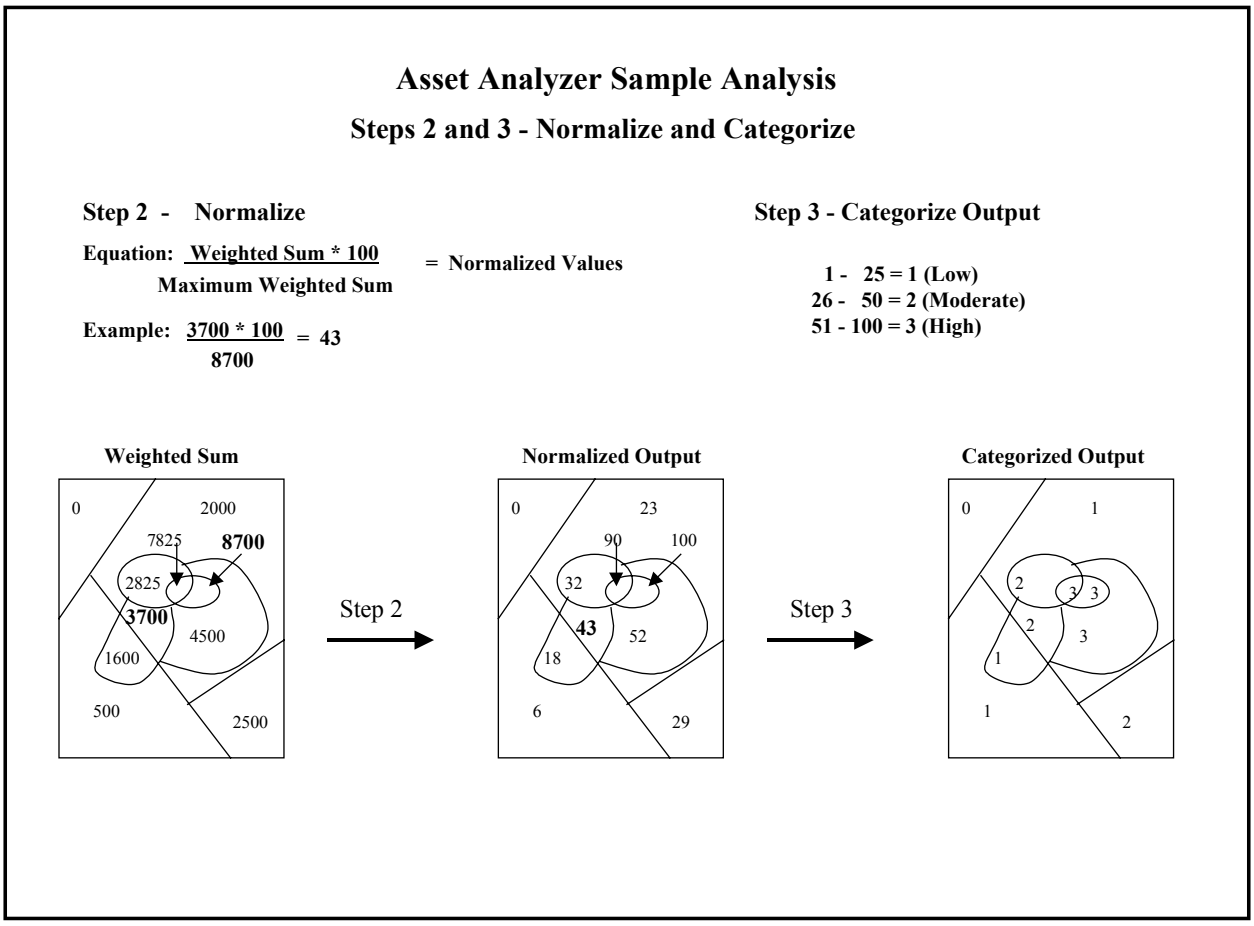

Figure 3

Version 1 of the Asset Analyzer was demonstrated; however, a contract is currently being negotiated to develop Version 2. The Asset Analyzer has application both in its original context of identifying areas of high values at risk should a fire occur, as well as in the broader context of a decision-making tool. It is being used by SSGIC in both contexts.

Each agency was encouraged to develop their own datasets of locally important values. Larry Vredenburgh and Tony Sarzotti presented five themes developed by the Bureau of Land Management (Table 3 in Appendix A). Larry Vredenburgh also demonstrated the Asset Analyzer using locally developed values. He identified some of the limitations of Version 1 and enhancements that will be implemented in Version 2.

Development of 10 Integration Scenarios

A discussion was held on how to best utilize available analysis outputs to identify high priority fuels treatment areas, especially areas near agency boundaries. Several approaches were considered including developing a range of scenarios focusing on specific goals such as 1) maximizing ecological benefits or 2) minimizing loss/damage to assets or 3) reducing risk to firefighters. However, an alternative approach was selected that focused directly on the SSGIC goal to benefit fire management operations by:

- Reducing fuel loading
- Increasing firefighter safety
- Decreasing resistance to control

Prototype scenarios were interactively developed, entered into the Asset Analyzer, and analyzed. This served to get a "feel" for how the Asset Analyzer works, its sensitivity, resolution of the outputs, etc. Conclusions reached included that too many source datasets resulted in "watered down" outputs and that the WFSI masked the individual FOA and FlamMap contributions.

A two-phase process was defined. The initial phase will focus on seven source datasets selected by this group and evaluated at the landscape level using low resolution analysis (500 meter grid cell size). These outputs will be used to select smaller focus areas based on identified "hot spots" and opportunities for cooperative planning (i.e., near jurisdictional boundaries). A second phase will evaluate the focus areas. This will be carried out at high resolution (30 meter grid cell size) for project level planning.

Table 1 contains the seven selected datasets for phase one with 10 weighting scenarios developed. The selected datasets include:

- FOA – Eight categories based on 20 years of historical ignition data. Units of the original data are ignitions per 1000 acres per year. Category 8 (normalized to 100) represents more than 2 ignitions per 1000 acres per year.
- FRID – Five categories defined by the number of Fire Return Intervals (FRI) missed follow:
  0 = non-burnable,
  25 = no return intervals missed
  50 = 1-2 intervals missed
  75 = 2-5 intervals missed
  100 = 5-16 intervals missed

- FRID Confidence – The level of confidence in the FRI is highly dependent on the vegetation type. For example, sufficient data has been collected in the Ponderosa pine type to feel confident in the FRI values. However, very little data is available on FRI's for grasslands or desert types. Consequently, the value placed on the FRID in an analysis may be dependent on the level of confidence in the data. Categories are:
  0 = non-burnable
  25 = estimate
  50 = very poor
  75 = poor
  100 = good

- Threatened Wildland Urban Interface (WUI) – This dataset was provided by CDF. It contains one and one half mile buffers around the federally identified WUI's (housing densities greater than one house per 40 acres in wildland fuel types). Assigned values of 33 (low), 68 (moderate), or 100 (high) are based on a combination of hazard rank and fire probability.

- Firefighter Safety – This theme was developed implementing the Sequoia and Kings Canyon National Parks model for firefighter safety. Five datasets contributed to the model and a weighted sum was calculated and values of low (33), moderate (68) or high (100) assigned. Input datasets and weights were:

Source dataset	High	Moderate	Low
Fuels	9	6	1
Slope	9	5	1
Aspect	5	3	1
Elevation	3	2	1
Road accessibility	7	4	1

- Flame Length/Extreme Weather – This dataset was generated by FLAMMAP and predicts flame length. The classifications were derived from the Hauling Fire Characteristics Chart descriptions of initial attack strategies. They are:
  - 0 = non-burnable
  - 25 = 0-4 feet - direct attack with hand crews
  - 50 = 4-8 feet - direct attack with equipment such as engines and retardant
  - 75 = 8=11 feet – indirect attack of fire required
  - 100 = 11+ feet – indirect attack unlikely to be successful

  The extreme weather category (98-100 weather percentile) was selected to focus on the most severe behavior.
- Crown Fire Activity/Extreme Weather – This dataset was also generated by FLAMMAP and predicts crown fire behavior. A value of 33 represents predicted surface fires, a value of 68 predicts passive crown fires, and a value of 100 represents active crown fires. Again, the extreme weather category was selected to focus on the most severe behavior.

Scenario Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Dataset	**Assigned Weights**									
FOA	14	17	17	20						
FRID	14	17	17	20	25	20	12	25	52	12
FRID Confidence	14	13						25		
Threatened WUI's	14	17	17	20	25	20	52	25	12	12
Firefighter Safety	14		17			20	12		12	52
Flame Length – Extreme Weather	14	17	17	20	25	20	12	25	12	12
Crown Fire Activity–Ext. Weather	15	18	17	20	25	20	12		12	12

Table 1

Anne Birkholz will run these 10 analyses and provide each agency with a CD of the outputs within two weeks. This will include a 1.5 mile buffer surrounding land status boundaries to identify areas near boundaries. Each agency will evaluate the results and come to the next meeting, scheduled for October 30, 2002, prepared to discuss these results and proceed with the second phase of the analysis.

Summary

The goal of the meeting was to develop a process to identify high priority fuel treatment areas based on the integration of completed analyses. The analysis process and their outputs were reviewed. The Asset Analyzer ArcView extension was demonstrated and datasets formatted for use with it reviewed. Fire managers and fuels specialists developed a two-phase approach focused directly on SSGIC goals. Ten scenarios based on seven datasets with various weighting schemes were developed to display a range of outputs. On October 30, 2002, several focus areas will be selected for high resolution analysis and priority fuels treatment projects collaboratively identified.

Upcoming Meetings

The following activities are scheduled for the SSGIC in the upcoming months.

- October 3, 2002 – General SSGIC meeting.
- October 30, 2002 – Fire managers and fuels specialists meet to continue the process begun at this meeting.
- December 2-5, 2002 – 2002 California Association of Fire Ecologists Conference in San Diego – SSGIC will be presenting a ½ day workshop.
- December 11, 2002 – Present the SSGIC program to managers and consider its future form

Appendix A – Datasets Developed for Asset Analyzer Use

Table 1 - Base Datasets

Theme Name	Categories/Values Assigned	Theme Description or Definition
Hydroelectric power generation	1 - 98	20 miles upstream watershed, megawatt capacity, river run vs. reservoir plant
Range forage	0 - 100	Dollar value of replacement forage normalized
Giant Sequoia Groves	0, 100	Mature Sequoia groves
Soils erosion potential	0 - 89	Slope times K factor normalized
Water storage	0, 100	20 miles upstream watershed from storage reservoirs
Water supply	1-100	One fourth mile buffer around domestic water diversions, number of diversions
Structures	0 - 100	2002 Census housing density as surrogate
Threatened Wildland Urban Interface (WUI)	4 categories	Federally identified WUI cities with hazard potential buffers; 0 = None 33 = Low 68 = Moderate 100 = High
Fire Frequency	0, 10, 20,30, current max = 80	Number of historically recorded fires times 10, current maximum of 80 (8 fires)

Table 2. - Analysis Outputs

Theme Name	Categories/Values Assigned	Theme Description or Definition
FOA	9 categories	Density of ignitions derived from 20 years ignition data
FRID	5 categories	0 = non-burnable, 25 = no return intervals missed 50 = 1-2 intervals missed 75 = 2-5 intervals missed 100 = 5-16 intervals missed
FRID confidence level	5 categories	0 = non-burnable 25 = estimate 50 = very poor 75 = poor 100 = good
Flammap Flame Length Low weather category	5 categories	0 = non-burnable 25 = 0-4 feet 50 = 4-8 feet 75 = 8-11 feet 100 = 11+ feet
Flammap Flame Length Extreme weather category	5 categories	
Flammap Crown Fire Activity Low weather category	4 categories	0 = non-burnable 33 = surface fire 68 = passive crown fire 100 = active crown fire
Flammap Crown Fire Activity Extreme weather category	4 categories	
Flammap Rate of Spread Low weather category	10 categories	Normalized outputs
Flammap Rate of Spread Extreme weather category	10 categories	Normalized outputs
Final Fire Size from WFSI Low weather category	9 categories	Normalized outputs
Final Fire Size from WFSI Moderate weather category	9 categories	Normalized outputs
Final Fire Size from WFSI High weather category	9 categories	Normalized outputs
Final Fire Size from WFSI Extreme weather category	9 categories	Normalized outputs
WFSI	10 categories	Normalized outputs

Table 3. - BLM Datasets

Theme Name	Categories/Values Assigned	Theme Description or Definition
Pacific Crest Trail	0, 100	One mile buffer around trail
BLM campgrounds	0, 100	One mile buffer around campgrounds
BLM wilderness	25, 50, 75, 100	Designated wilderness with values from fire response zones
BLM special areas	25, 50, 75, 100	Special interest areas with values from fire response zones
BLM fire stations and communication towers	50, 100	One mile buffers; fire stations = 100 communication towers = 50